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EXAMINER	
COUGHLAN, PETER D	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	**Application No.** 10/627,355	**Applicant(s)** LLINAS ET AL.
	Examiner PETER COUGHLAN	**Art Unit** 2129

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 December 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *12-46* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *12-46* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Detailed Action

1. In view of the Appeal Brief filed on December 23, 2009, **PROSECUTION IS HEREBY REOPENED**. A new ground of rejection set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

/Donald Sparks/

Supervisory Patent Examiner, Art Unit 2129.

Status of Claims

2. Claims 12-46 are pending.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 19, 27, 36 and 44 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. These claims state that 'the step of creating a first cluster of control circuits and a second cluster of a control circuits, the first cluster of control circuits being characterized by a higher degree of coupling between control circuits of the first cluster relative to a lower degree of coupling between control circuits of the first cluster and control circuits of the second cluster.' The claim language is very specific in this characteristic where as the specification is not as specific. The specification states that 'generally the coupling between units inside a cluster is stronger than between units at the boundary of clusters.' The specification is not as precise as the claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 12, 13, 18-21, 26-30, 35-38, 43, 44, 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sedra in view of Fagg. ('Microelectronic circuits', referred to as **Sedra**; 'Cerebellar Learning for Control of a two Link Arm in Muscle Space', referred to as **Fagg**)

Claim 12

Sedra teaches a plurality of control circuits, each control circuit comprising the following elements an input receiving connection for receiving an input signal (**Sedra,** p974-975, Fig 12.1; 'Input receiving connection' of applicant is illustrated by the input of 'X_s' of Sedra.) an oscillation generation circuit for generating at a first output terminal an oscillation output signal having an amplitude, phase and a frequency (**Sedra,** p974-975, Fig 12.1; The oscillator feedback loop of Sedra generates sinusoidal oscillations. It

is inherent that oscillations have 'amplitude, phase and a frequency.) a first spike generation circuit in communication with the oscillation generation circuit for generating a first spike signal when the oscillation output signal crosses a first threshold value, the first spike signal being provided at the first output terminal (**Sedra,** fig 12.10, p986 through p988; 'First spike generation circuit' of applicant maps to ''high – Q bandpass filter' of Sedra. 'First threshold value' of applicant maps to '+V' of Sedra. 'First output terminal' of applicant maps to 't' of Sedra.) a second spike generation circuit in communication with the oscillation generation circuit for generating a second spike signal when the oscillation output signal crosses a second threshold value, the second spike signal being provided at the first output terminal (**Sedra,** fig 12.10, p986 through p988; 'Second spike generation circuit' of applicant maps to 'high Q – bandpass filter' of applicant. 'Second spike signal' of applicant maps to '-V' of Sedra. 'First output terminal' of applicant maps to 't' of Sedra.) wherein the oscillation output signal, the first spike signal and the second spike signal collectively form a composite output signal. (**Sedra,** fig 12.10, p986 through p988; 'Composite output signal' of applicant maps to the oscillation from +V to –V of Sedra.)

Sedra does not teach which is capable of controlling an actuating element, and wherein characteristic information of the actuating element is provided as part of the input signal to the control circuit.

Fagg teaches which is capable of controlling an actuating element, and wherein characteristic information of the actuating element is provided as part of the input signal to the control circuit. (**Fagg,** p2638, C2:11 through p2639, C1:21; Controlling a

'actuating element' of applicant is equivalent to 'planer arm' of Fagg. 'Characteristic information' as 'part of the input signal to the control circuit' of applicant is disclosed by the inferior olive function as estimating movement errors which are then used to update the APG of Fagg.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Sedra by using one circuit to move an arm and a second circuit to make corrections as taught by Fagg to which is capable of controlling an actuating element, and wherein characteristic information of the actuating element is provided as part of the input signal to the control circuit.

For the purpose of using an oscillation to which mimics an organic machine to control an actuator.

Sedra teaches to thereby adjust one of the amplitude and frequency of the oscillation output signal. (**Sedra,** p974-975, Fig 12.1; 'Amplitude' of applicant is controlled by 'amplifier' of Sedra. 'Frequency' of applicant is controlled by 'frequency-selective' of Sedra.)

Sedra does not teach phase

Fagg teaches phase. (**Fagg,** abstract; 'Phase' of applicant is disclosed by 'This model uses the combination delayed sensory signals and …' of Fagg.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Sedra by changing the phase as taught by Fagg to have phase.

For the purpose of putting various oscillations into synchronous behavior for improved movement.

Claim 13

Sedra does not teach wherein a phase characteristic of the composite output signal of a first control circuit is maintained at a predetermined level relative to a phase characteristic of the composite output signal of a second control circuit.

Fagg teaches wherein a phase characteristic of the composite output signal of a first control circuit is maintained at a predetermined level relative to a phase characteristic of the composite output signal of a second control circuit. (**Fagg,** p2638, C2:11 through p2639, C1:21; The 'output signal of a first control circuit is maintained at a predetermined level relative to a phase characteristic of the composite output signal of a second control circuit' of applicant is disclosed by the adjustable pattern generators functions with or without input from the extra-cerebellar module. The extra-cerebellar only becomes active when the arm does not reach it goal.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Sedra by having independent output signals as taught by Fagg to have wherein a phase characteristic of the composite output signal of a first control circuit is maintained at a predetermined level relative to a phase characteristic of the composite output signal of a second control circuit.

For the purpose of having a different signal for correcting the movement of an arm.

Claim 18

Sedra does not teach a command input for controlling the coupling between control circuits.

Fagg teaches a command input for controlling the coupling between control circuits. (**Fagg,** p2638, C2:11 through p2639, C1:21; ‘Command input’ of applicant is equivalent to the ‘adjustable pattern generators each of which drive a single muscle’ of Fagg.) It would have been obvious to a person having ordinary skill in the art at the time of applicant’s invention to modify the teachings of Sedra by having adjustable input as taught by Fagg to have a command input for controlling the coupling between control circuits.

For the purpose of being able to modify the circuits performance for improved results.

Claim 19

Sedra does not teach a first cluster of control circuits and a second cluster of control circuits, the first cluster of control circuits being characterized by a higher degree of coupling between control circuits of the first cluster relative to a lower degree of coupling between control circuits of the first cluster and control circuits of the second cluster.

Fagg teaches a first cluster of control circuits and a second cluster of control circuits, the first cluster of control circuits being characterized by a higher degree of coupling between control circuits of the first cluster relative to a lower degree of coupling between control circuits of the first cluster and control circuits of the second cluster.

(**Fagg,** p2638, C2:26 through p2639, C1:21; 'First spike generation circuit' of applicant is equivalent to the 'adjustable pattern generators' of Fagg. The 'first threshold' of applicant is disclosed by the desire to move the 'single muscle' of Fagg. This operates regardless of input from the extra cerebellar. Thus there is a lower degree of coupling between the first and second circuits. The coupling within the first circuit is higher due to the specific function of movement of an arm is associated with the adjustable pattern generator.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Sedra by having clusters acting semi-independently with other clusters as taught by Fagg to have a first cluster of control circuits and a second cluster of control circuits, the first cluster of control circuits being characterized by a higher degree of coupling between control circuits of the first cluster relative to a lower degree of coupling between control circuits of the first cluster and control circuits of the second cluster.

For the purpose of having clusters perform a given function with some coordination among other clusters for improved performance.

Claim 20

Sedra teaches a plurality of control circuits, each control circuit comprising the following elements an input receiving connection for receiving an input signal (**Sedra,** p974-975, Fig 12.1; 'Input receiving connection' of applicant is illustrated by the input of 'X_s' of Sedra.) an oscillation generation circuit for generating at a first output terminal and a second output terminal an oscillation output signal having an amplitude, phase

and a frequency (**Sedra,** p974-975, Fig 12.1; The oscillator feedback loop of Sedra generates sinusoidal oscillations. It is inherent that oscillations have 'amplitude, phase and a frequency.) a first spike generation circuit in communication with the oscillation generation circuit for generating a first spike signal when the oscillation output signal crosses a first threshold value, the first spike signal being provided at the first output terminal and the second output terminal (**Sedra,** fig 12.10, p986 through p988; 'First spike generation circuit' of applicant maps to "high – Q bandpass filter' of Sedra. 'First threshold value' of applicant maps to '+V' of Sedra. 'First output terminal' of applicant maps to 't' of Sedra. 'Second output terminal' of applicant maps to the output of the 'hard limiter' of Sedra.) a second spike generation circuit in communication with the oscillation generation circuit for generating a second spike signal when the oscillation output signal crosses a second threshold value, the second spike signal being provided at the first output terminal (**Sedra,** fig 12.10, p986 through p988; 'Second spike generation circuit' of applicant maps to 'high Q – bandpass filter' of applicant. 'Second spike signal' of applicant maps to '-V' of Sedra. 'First output terminal' of applicant maps to 't' of Sedra.) wherein the oscillation output signal, the first spike signal and the second spike signal collectively form a first composite output signal at the first output terminal, and the oscillation output signal and the first spike signal collectively form a second composite output signal at the second output terminal. (**Sedra,** fig 12.10, p986 through p988; 'Composite output signal' of applicant maps to the oscillation from +V to –V of Sedra. 'First output terminal' of applicant maps to 't' of

Sedra. 'Second output terminal' of applicant maps to the output of the 'hard limiter' of Sedra.)

Sedra does not teach such that at least one of the composite output signals is capable of controlling an actuating element, and wherein characteristic information of the actuating element is provided as part of the input signal to the control circuit.

Fagg teaches such that at least one of the composite output signals is capable of controlling an actuating element, and wherein characteristic information of the actuating element is provided as part of the input signal to the control circuit. (**Fagg,** p2638, C2:11 through p2639, C1:21; Controlling a 'actuating element' of applicant is equivalent to 'planer arm' of Fagg. 'Characteristic information' as 'part of the input signal to the control circuit' of applicant is disclosed by the inferior olive function as estimating movement errors which are then used to update the APG of Fagg.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Sedra by using one circuit to move an arm and a second circuit to make corrections as taught by Fagg to have such that at least one of the composite output signals is capable of controlling an actuating element, and wherein characteristic information of the actuating element is provided as part of the input signal to the control circuit.

For the purpose of using an oscillation to which mimics an organic machine to control an actuator.

Sedra teaches to thereby adjust one of the amplitude and frequency of the oscillation output signal. (**Sedra,** p974-975, Fig 12.1; 'Amplitude' of applicant is

controlled by ‘amplifier’ of Sedra. ‘Frequency’ of applicant is controlled by ‘frequency-selective’ of Sedra.)

Sedra does not teach phase.

Fagg teaches phase. (**Fagg,** abstract; ‘Phase’ of applicant is disclosed by ‘This model uses the combination delayed sensory signals and …’ of Fagg.) It would have been obvious to a person having ordinary skill in the art at the time of applicant’s invention to modify the teachings of Sedra by changing the phase as taught by Fagg to have phase. (copy what the applicant claims).

For the purpose of putting various oscillations into synchronous behavior for improved movement.

Claim 21

Sedra does not teach wherein a phase characteristic of the composite output signal of a first control circuit is maintained at a predetermined level relative to a phase characteristic of the composite output signal of a second control circuit.

Fagg teaches wherein a phase characteristic of the composite output signal of a first control circuit is maintained at a predetermined level relative to a phase characteristic of the composite output signal of a second control circuit. (**Fagg,** p2638, C2:11 through p2639, C1:21; The ‘output signal of a first control circuit is maintained at a predetermined level relative to a phase characteristic of the composite output signal of a second control circuit’ of applicant is disclosed by the adjustable pattern generators functions with or without input from the extra-cerebellar module. The extra-cerebellar

only becomes active when the arm does not reach it goal.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Sedra by having independent output signals as taught by Fagg to have wherein a phase characteristic of the composite output signal of a first control circuit is maintained at a predetermined level relative to a phase characteristic of the composite output signal of a second control circuit.

For the purpose of having a different signal for correcting the movement of an arm.

Claim 26

Sedra does not teach a command input for controlling the coupling between control circuits.

Fagg teaches a command input for controlling the coupling between control circuits. (**Fagg,** p2638, C2:11 through p2639, C1:21; 'Command input' of applicant is equivalent to the 'adjustable pattern generators each of which drive a single muscle' of Fagg.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Sedra by having adjustable input as taught by Fagg to have a command input for controlling the coupling between control circuits.

For the purpose of being able to modify the circuits performance for improved results.

Claim 27

Sedra does not teach a first cluster of control circuits and a second cluster of control circuits, the first cluster of control circuits being characterized by a higher degree of coupling between control circuits of the first cluster relative to a lower degree of coupling between control circuits of the first cluster and control circuits of the second cluster.

Fagg teaches a first cluster of control circuits and a second cluster of control circuits, the first cluster of control circuits being characterized by a higher degree of coupling between control circuits of the first cluster relative to a lower degree of coupling between control circuits of the first cluster and control circuits of the second cluster. (**Fagg,** p2638, C2:26 through p2639, C1:21; 'First spike generation circuit' of applicant is equivalent to the 'adjustable pattern generators' of Fagg. The 'first threshold' of applicant is disclosed by the desire to move the 'single muscle' of Fagg. This operates regardless of input from the extra cerebellar. Thus there is a lower degree of coupling between the first and second circuits. The coupling within the first circuit is higher due to the specific function of movement of an arm is associated with the adjustable pattern generator.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Sedra by having clusters acting semi-independently with other clusters as taught by Fagg to have a first cluster of control circuits and a second cluster of control circuits, the first cluster of control circuits being characterized by a higher degree of coupling between control circuits of the first

cluster relative to a lower degree of coupling between control circuits of the first cluster and control circuits of the second cluster.

For the purpose of having clusters perform a given function with some coordination among other clusters for improved performance.

Claim 28

Sedra teaches a plurality of control circuits, each control circuit comprising the following elements an input receiving connection for receiving an input signal (**Sedra,** p974-975, Fig 12.1; 'Input receiving connection' of applicant is illustrated by the input of 'X_s' of Sedra.) an oscillation generation circuit for generating at a first output terminal an oscillation output signal having an amplitude, phase and a frequency (**Sedra,** p974-975, Fig 12.1; The oscillator feedback loop of Sedra generates sinusoidal oscillations. It is inherent that oscillations have 'amplitude, phase and a frequency.) a first spike generation circuit in communication with the oscillation generation circuit for generating a first spike signal when the oscillation output signal crosses a first threshold value, the first spike signal being provided at the first output terminal (**Sedra,** fig 12.10, p986 through p988; 'First spike generation circuit' of applicant maps to ''high – Q bandpass filter' of Sedra. 'First threshold value' of applicant maps to '+V' of Sedra. 'First output terminal' of applicant maps to 't' of Sedra.) a second spike generation circuit in communication with the oscillation generation circuit for generating a second spike signal when the oscillation output signal crosses a second threshold value, the second

spike signal being provided at the first output terminal (**Sedra,** fig 12.10, p986 through p988; 'Second spike generation circuit' of applicant maps to 'high Q – bandpass filter' of applicant. 'Second spike signal' of applicant maps to '-V' of Sedra. 'First output terminal' of applicant maps to 't' of Sedra.) wherein the oscillation output signal, the first spike signal and the second spike signal collectively form a composite output signal. (**Sedra,** fig 12.10, p986 through p988; 'Composite output signal' of applicant maps to the oscillation from +V to –V of Sedra.)

Sedra does not teach which is capable of controlling an actuating element, and wherein a sensor is used to obtain characteristic information of the actuating element such that the characteristic information is provided as part of the input signal to the control circuit.

Fagg teaches which is capable of controlling an actuating element, and wherein a sensor is used to obtain characteristic information of the actuating element such that the characteristic information is provided as part of the input signal to the control circuit. (**Fagg,** p2638, C2:11 through p2639, C1:21; Controlling a 'actuating element' of applicant is equivalent to 'planer arm' of Fagg. 'Characteristic information' as 'part of the input signal to the control circuit' of applicant is disclosed by the inferior olive function as estimating movement errors which are then used to update the APG of Fagg.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Sedra by using one circuit to move an arm and a second circuit to make corrections as taught by Fagg to have which is capable of controlling an actuating element, and wherein a sensor is used to obtain characteristic

information of the actuating element such that the characteristic information is provided as part of the input signal to the control circuit.

For the purpose of using an oscillation to which mimics an organic machine to control an actuator.

Sedra teaches to thereby adjust one of the amplitude and frequency of the oscillation output signal. (**Sedra,** p974-975, Fig 12.1; ‘Amplitude’ of applicant is controlled by ‘amplifier’ of Sedra. ‘Frequency’ of applicant is controlled by ‘frequency-selective’ of Sedra.)

Sedra does not teach phase and further wherein the input signal is used to synchronize controlled movement of the actuation elements.

Fagg teaches phase, (**Fagg,** abstract; ‘Phase’ of applicant is disclosed by ‘This model uses the combination delayed sensory signals and …’ of Fagg.), and further wherein the input signal is used to synchronize controlled movement of the actuation elements. (**Fagg,** abstract; ‘Synchronize controlled movements’ of applicant is illustrated by ‘the model learns in a trial and error fashion to produce bursts of muscle activity that accurately bring the arm to a specific target’ of Fagg.) It would have been obvious to a person having ordinary skill in the art at the time of applicant’s invention to modify the teachings of Sedra by changing the phase as taught by Fagg to have phase and further wherein the input signal is used to synchronize controlled movement of the actuation elements.

For the purpose of putting various oscillations into synchronous behavior for improved movement.

Claim 29

Sedra teaches using a plurality of control circuits, each control circuit performing the following steps receiving an input signal at an input receiving connection (**Sedra,** p974-975, Fig 12.1; 'Input receiving connection' of applicant is illustrated by the input of 'X_s' of Sedra.) generating at a first output terminal an oscillation output signal having an amplitude and a frequency (**Sedra,** p974-975, Fig 12.1; The oscillator feedback loop of Sedra generates sinusoidal oscillations. It is inherent that oscillations have 'amplitude, phase and a frequency.) generating a first spike signal when the oscillation output signal crosses a first threshold value, the first spike signal being provided at the first output terminal (**Sedra,** fig 12.10, p986 through p988; 'First spike signal' of applicant maps to '+V' of Sedra. 'Being provided at the first output terminal' of applicant maps to 't' of Sedra.) generating a second spike signal when the oscillation output signal crosses a second threshold value, the second spike signal being provided at the first output terminal (**Sedra,** fig 12.10, p986 through p988; 'Second spike signal' and its associated 'threshold' of applicant maps to '-V' of Sedra. 'First output terminal' of applicant maps to 't' of Sedra.) wherein the oscillation output signal, the first spike signal and the second spike signal collectively form a composite output signal. (**Sedra,** fig 12.10, p986 through p988; 'Composite output signal' of applicant maps to the oscillation from +V to –V of Sedra.)

Sedra does not teach which is capable of controlling an actuating element, and further comprising the step of obtaining characteristic information of the actuating element which is provided as part of the input signal to the control circuit.

Fagg teaches which is capable of controlling an actuating element, and further comprising the step of obtaining characteristic information of the actuating element which is provided as part of the input signal to the control circuit. (**Fagg,** p2638, C2:11 through p2639, C1:21; Controlling a 'actuating element' of applicant is equivalent to 'planer arm' of Fagg. 'Characteristic information' as 'part of the input signal to the control circuit' of applicant is disclosed by the inferior olive function as estimating movement errors which are then used to update the APG of Fagg.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Sedra by using one circuit to move an arm and a second circuit to make corrections as taught by Fagg by which is capable of controlling an actuating element, and further comprising the step of obtaining characteristic information of the actuating element which is provided as part of the input signal to the control circuit.

For the purpose of using an oscillation to which mimics an organic machine to control an actuator.

Sedra teaches to thereby adjust one of the amplitude and frequency of the oscillation output signal. (**Sedra,** p974-975, Fig 12.1; 'Amplitude' of applicant is controlled by 'amplifier' of Sedra. 'Frequency' of applicant is controlled by 'frequency-selective' of Sedra.)

Sedra does not teach phase.

Fagg teaches phase. (**Fagg,** abstract; ‘Phase’ of applicant is disclosed by ‘This model uses the combination delayed sensory signals and …’ of Fagg.) It would have been obvious to a person having ordinary skill in the art at the time of applicant’s invention to modify the teachings of Sedra by changing the phase as taught by Fagg to have phase.

For the purpose of putting various oscillations into synchronous behavior for improved movement.

Claim 30

Sedra does not teach wherein a phase characteristic of the composite output signal of a first control circuit is maintained relative to a phase characteristic of the composite output signal of a second control circuit.

Fagg teaches wherein a phase characteristic of the composite output signal of a first control circuit is maintained relative to a phase characteristic of the composite output signal of a second control circuit. (**Fagg,** p2638, C2:11 through p2639, C1:21; The ‘output signal of a first control circuit is maintained at a predetermined level relative to a phase characteristic of the composite output signal of a second control circuit’ of applicant is disclosed by the adjustable pattern generators functions with or without input from the extra-cerebellar module. The extra-cerebellar only becomes active when the arm does not reach it goal.) It would have been obvious to a person having ordinary skill in the art at the time of applicant’s invention to modify the teachings of Sedra by having independent output signals as taught by Fagg to have wherein a phase

characteristic of the composite output signal of a first control circuit is maintained relative to a phase characteristic of the composite output signal of a second control circuit.

For the purpose of having a different signal for correcting the movement of an arm.

Claim 35

Sedra does not teach the step of applying a command input for controlling the coupling between control circuits.

Fagg teaches the step of applying a command input for controlling the coupling between control circuits. (**Fagg,** p2638, C2:11 through p2639, C1:21; 'Command input' of applicant is equivalent to the 'adjustable pattern generators each of which drive a single muscle' of Fagg.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Sedra by having adjustable input as taught by Fagg to have the step of applying a command input for controlling the coupling between control circuits.

For the purpose of being able to modify the circuits performance for improved results.

Claim 36

Sedra does not teach the step of creating a first cluster of control circuits and a second cluster of a control circuits, the first cluster of control circuits being characterized by a higher degree of coupling between control circuits of the first cluster relative to a lower degree of coupling between control circuits of the first cluster and control circuits of the second cluster.

Fagg teaches the step of creating a first cluster of control circuits and a second cluster of a control circuits, the first cluster of control circuits being characterized by a higher degree of coupling between control circuits of the first cluster relative to a lower degree of coupling between control circuits of the first cluster and control circuits of the second cluster. (**Fagg,** p2638, C2:26 through p2639, C1:21; 'First spike generation circuit' of applicant is equivalent to the 'adjustable pattern generators' of Fagg. The 'first threshold' of applicant is disclosed by the desire to move the 'single muscle' of Fagg. This operates regardless of input from the extra cerebellar. Thus there is a lower degree of coupling between the first and second circuits. The coupling within the first circuit is higher due to the specific function of movement of an arm is associated with the adjustable pattern generator.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Sedra by having clusters acting semi-independently with other clusters as taught by Fagg to have the step of creating a first cluster of control circuits and a second cluster of a control circuits, the first cluster of control circuits being characterized by a higher degree of coupling between control circuits of the first cluster relative to a lower degree of coupling between control circuits of the first cluster and control circuits of the second cluster.

For the purpose of having clusters perform a given function with some coordination among other clusters for improved performance.

Claim 37

Sedra teaches using a plurality of control circuits, each control circuit performing the following steps: receiving an input signal at an input receiving connection (**Sedra,** p974-975, Fig 12.1; Both of the 'amplifier A' and 'frequency-selective network B' of Sedra have the ability to receive input signals.), generating at a first output terminal and at a second output terminal (**Sedra,** p974-975, Fig 12.1; 'First output terminal' of applicant maps to 't' of Sedra. 'Second output terminal of applicant is maps to the output of the 'hard limiter' of Sedra.) an oscillation output signal having an amplitude, phase and a frequency (**Sedra,** p974-975, Fig 12.1; The oscillator feedback loop of Sedra generates sinusoidal oscillations. It is inherent that oscillations have 'amplitude, phase and a frequency.) generating a first spike signal when the oscillation output signal crosses a first threshold value, the first spike signal being provided at the first output terminal and the second output terminal (**Sedra,** fig 12.10, p986 through p988; 'First spike signal' and associated 'first threshold' of applicant maps to '+V' 'First output terminal' of applicant maps to 't' of Sedra. 'Second output terminal' of applicant maps to the output of the 'hard limiter' of Sedra.) generating a second spike signal when the oscillation output signal crosses a second threshold value, the second spike signal being provided at the first output terminal (**Sedra,** fig 12.10, p986 through p988; 'Second spike signal' and its associated 'threshold' of applicant maps to '-V' of Sedra.

'First output terminal' of applicant maps to 't' of Sedra.) wherein the oscillation output signal, the first spike signal and the second spike signal collectively form a composite output signal at the first output terminal, and the oscillation output signal and the first spike signal collectively form a second composite output signal at the second output terminal. (**Sedra,** fig 12.10, p986 through p988; 'Composite output signal' of applicant maps to the oscillation from +V to –V of Sedra. 'First output terminal' of applicant maps to 't' of Sedra. 'Second output terminal' of applicant maps to the output of the 'hard limiter' of Sedra.)

Sedra does not teach such that at least one of the composite output signals is capable of controlling an actuating element, and further comprising the step of obtaining characteristic information of the actuating element which is provided as part of the input signal to the control circuit.

Fagg teaches such that at least one of the composite output signals is capable of controlling an actuating element, and further comprising the step of obtaining characteristic information of the actuating element which is provided as part of the input signal to the control circuit. (**Fagg,** p2638, C2:11 through p2639, C1:21; Controlling a 'actuating element' of applicant is equivalent to 'planer arm' of Fagg. 'Characteristic information' as 'part of the input signal to the control circuit' of applicant is disclosed by the inferior olive function as estimating movement errors which are then used to update the APG of Fagg.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Sedra by using one circuit to move an arm and a second circuit to make corrections as taught by Fagg such

that at least one of the composite output signals is capable of controlling an actuating element, and further comprising the step of obtaining characteristic information of the actuating element which is provided as part of the input signal to the control circuit.

For the purpose of using an oscillation to which mimics an organic machine to control an actuator.

Sedra teaches to thereby adjust one of the amplitude and frequency of the oscillation output signal. (**Sedra,** p974-975, Fig 12.1; ‘Amplitude’ of applicant is controlled by ‘amplifier’ of Sedra. ‘Frequency’ of applicant is controlled by ‘frequency-selective’ of Sedra.)

Sedra does not teach phase.

Fagg teaches phase. (**Fagg,** abstract; ‘Phase’ of applicant is disclosed by ‘This model uses the combination delayed sensory signals and ...’ of Fagg.) It would have been obvious to a person having ordinary skill in the art at the time of applicant’s invention to modify the teachings of Sedra by changing the phase as taught by Fagg to have phase.

For the purpose of putting various oscillations into synchronous behavior for improved movement.

Claim 38

Sedra does not teach wherein a phase characteristic of the composite output signal of a first control circuit is maintained relative to a phase characteristic of the composite output signal of a second control circuit.

Fagg teaches wherein a phase characteristic of the composite output signal of a first control circuit is maintained relative to a phase characteristic of the composite output signal of a second control circuit. (**Fagg,** p2638, C2:11 through p2639, C1:21; The 'output signal of a first control circuit is maintained at a predetermined level relative to a phase characteristic of the composite output signal of a second control circuit' of applicant is disclosed by the adjustable pattern generators functions with or without input from the extra-cerebellar module. The extra-cerebellar only becomes active when the arm does not reach it goal.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Sedra by having independent output signals as taught by Fagg to have wherein a phase characteristic of the composite output signal of a first control circuit is maintained relative to a phase characteristic of the composite output signal of a second control circuit.

For the purpose of having a different signal for correcting the movement of an arm.

Claim 43

Sedra does not teach the step of applying a command input for controlling the coupling between control circuits.

Fagg teaches the step of applying a command input for controlling the coupling between control circuits. (**Fagg,** p2638, C2:11 through p2639, C1:21; ‘Command input’ of applicant is equivalent to the ‘adjustable pattern generators each of which drive a single muscle’ of Fagg.) It would have been obvious to a person having ordinary skill in the art at the time of applicant’s invention to modify the teachings of Sedra by having adjustable input as taught by Fagg to have the step of applying a command input for controlling the coupling between control circuits.

For the purpose of being able to modify the circuits performance for improved results.

Claim 44

Sedra does not teach the step of creating a first cluster of control circuits and a second cluster of a control circuits, the first cluster of control circuits being characterized by a higher degree of coupling between control circuits of the first cluster relative to a lower degree of coupling between control circuits of the first cluster and control circuits of the second cluster.

Fagg teaches the step of creating a first cluster of control circuits and a second cluster of a control circuits, the first cluster of control circuits being characterized by a higher degree of coupling between control circuits of the first cluster relative to a lower degree of coupling between control circuits of the first cluster and control circuits of the second cluster. (**Fagg,** p2638, C2:26 through p2639, C1:21; ‘First spike generation circuit’ of applicant is equivalent to the ‘adjustable pattern generators’ of Fagg. The ‘first

threshold' of applicant is disclosed by the desire to move the 'single muscle' of Fagg. This operates regardless of input from the extra cerebellar. Thus there is a lower degree of coupling between the first and second circuits. The coupling within the first circuit is higher due to the specific function of movement of an arm is associated with the adjustable pattern generator.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Sedra by having clusters acting semi-independently with other clusters as taught by Fagg to have the step of creating a first cluster of control circuits and a second cluster of a control circuits, the first cluster of control circuits being characterized by a higher degree of coupling between control circuits of the first cluster relative to a lower degree of coupling between control circuits of the first cluster and control circuits of the second cluster.

For the purpose of having clusters perform a given function with some coordination among other clusters for improved performance.

Claim 46

Sedra does not teach wherein the first spike signal and the second spike signal have different amplitudes.

Fagg teaches wherein the first spike signal and the second spike signal have different amplitudes. (**Fagg,** p2638, C2:26 through p2639, C1:21; It is inherent that the second spike signal have a different amplitude than the first due to the design that the second spike signal is a correcting factor for the first spike signal. 'Second spike generation circuit' of applicant is equivalent to the 'extra cerebellar (EC)' of Fagg. The

'second threshold' of applicant is if the arm reaches its goal or not. If the are reached the goal, then the threshold has not been crossed. If the arm did not reach the goal, then the threshold has been crossed of Fagg) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Sedra by having different signals as taught by Fagg to have wherein the first spike signal and the second spike signal have different amplitudes.

For the purpose of using the second signal as a correction signal for the corresponding movement of the arm.

Claims 14-17, 22-25, 31-34, 39-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sedra and Fagg as applied to claims 12, 13, 18-21, 26-30, 35-38, 43, 44, 46 above, and further in view of Nekorkin. ('Homoclinic orbits and solitary waves in a one dimensional array of Chua's circuits', referred to as **Nekorkin**)

Claim 14

Sedra and Fagg do not teach at least one coupling element for coupling adjacent control circuits.

Nekorkin teaches at least one coupling element for coupling adjacent control circuits. (**Nekorkin,** p785, C1:1 through p786 C2:23; 'Coupling element for coupling adjacent control circuits' of applicant is illustrated by 'dynamics of coupled electronic oscillators' and 'The parameter d characterizes the strength of the coupling between the elements' of Nekorkin.) It would have been obvious to a person having ordinary skill in

the art at the time of applicant's invention to modify the combined teachings of Sedra and Fagg by having a link between adjacent neurons as taught by Nekorkin to have at least one coupling element for coupling adjacent control circuits.

Based on the assumption that adjacent neurons relate to adjacent engines, coupled neurons relate to coordination between neurons.

Claim 15

Sedra and Fagg do not teach wherein the coupling element comprises a variable impedance element.

Nekorkin teaches wherein the coupling element comprises a variable impedance element. (**Nekorkin,** p785, C1:1 through p786 C2:23; 'Variable impedance element' of applicant is equivalent to 'The nonlinear function f(x) describes the three segment piecewise linear resistor characteristic g(V).' of Nekorkin.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Sedra and Fagg by having a variable input for coupling as taught by Nekorkin to have wherein the coupling element comprises a variable impedance element.

For the purpose of reducing or increasing the coordination between the neurons to achieve the task at hand.

Claim 16

Sedra and Fagg do not teach a plurality of coupling elements, each coupling element connected to two adjacent control circuits to thereby provide coupling between the two adjacent control circuits.

Nekorkin teaches a plurality of coupling elements, each coupling element connected to two adjacent control circuits to thereby provide coupling between the two adjacent control circuits. (**Nekorkin,** p785, abstract; 'Plurality of coupling elements' of applicant is disclosed by 'models of coupled nonlinear oscillators' of Nekorkin.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Sedra and Fagg by having a connection between neurons as taught by Nekorkin to have a plurality of coupling elements, each coupling element connected to two adjacent control circuits to thereby provide coupling between the two adjacent control circuits.

For the purpose of being able to establish a link between two neurons for improving a coordination effort for the task at hand.

Claim 17

Sedra and Fagg do not teach wherein the impedance of the coupling elements is altered to thereby modify synchronization between coupled control circuits.

Nekorkin teaches wherein the impedance of the coupling elements is altered to thereby modify synchronization between coupled control circuits. (**Nekorkin,** p785, abstract; 'Modify synchronization between coupled control circuits' of applicant is disclosed by the study of nonlinear synchronization arrays and arrays of electronic

oscillators of Nekorkin.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Sedra and Fagg by using coupling to establish synchronization as taught by Nekorkin to have wherein the impedance of the coupling elements is altered to thereby modify synchronization between coupled control circuits.

For the purpose of obtaining synchronization between neurons.

Claim 22

Sedra and Fagg do not teach at least one coupling element for coupling adjacent control circuits.

Nekorkin teaches at least one coupling element for coupling adjacent control circuits. (**Nekorkin,** p785, C1:1 through p786 C2:23; 'Coupling element for coupling adjacent control circuits' of applicant is illustrated by 'dynamics of coupled electronic oscillators' and 'The parameter d characterizes the strength of the coupling between the elements' of Nekorkin.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Sedra and Fagg by having a link between adjacent neurons as taught by Nekorkin to have at least one coupling element for coupling adjacent control circuits.

Based on the assumption that adjacent neurons relate to adjacent engines, coupled neurons relate to coordination between neurons.

Claim 23

Sedra and Fagg do not teach wherein the coupling element comprises a variable impedance element.

Nekorkin teaches wherein the coupling element comprises a variable impedance element. (**Nekorkin,** p785, C1:1 through p786 C2:23; 'Variable impedance element' of applicant is equivalent to 'The nonlinear function f(x) describes the three segment piecewise linear resistor characteristic g(V).' of Nekorkin.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Sedra and Fagg by having a variable input for coupling as taught by Nekorkin to have wherein the coupling element comprises a variable impedance element.

For the purpose of reducing or increasing the coordination between the neurons to achieve the task at hand.

Claim 24

Sedra and Fagg do not teach a plurality of coupling elements, each coupling element connected to two adjacent control circuits to thereby provide coupling between the two adjacent control circuits.

Nekorkin teaches a plurality of coupling elements, each coupling element connected to two adjacent control circuits to thereby provide coupling between the two adjacent control circuits. (**Nekorkin,** p785, abstract; 'Plurality of coupling elements' of applicant is disclosed by 'models of coupled nonlinear oscillators' of Nekorkin.) It would

have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Sedra and Fagg by having a connection between neurons as taught by Nekorkin to have a plurality of coupling elements, each coupling element connected to two adjacent control circuits to thereby provide coupling between the two adjacent control circuits.

For the purpose of being able to establish a link between two neurons for improving a coordination effort for the task at hand.

Claim 25

Sedra and Fagg do not teach wherein the impedance of the coupling elements is altered to thereby modify synchronization between coupled control circuits.

Nekorkin teaches wherein the impedance of the coupling elements is altered to thereby modify synchronization between coupled control circuits. (**Nekorkin,** p785, abstract; 'Modify synchronization between coupled control circuits' of applicant is disclosed by the study of nonlinear synchronization arrays and arrays of electronic oscillators of Nekorkin.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Sedra and Fagg by using coupling to establish synchronization as taught by Nekorkin to have wherein the impedance of the coupling elements is altered to thereby modify synchronization between coupled control circuits.

For the purpose of obtaining synchronization between neurons.

Claim 31

Sedra and Fagg do not teach the step of using at least one coupling element for coupling adjacent control circuits.

Nekorkin teaches the step of using at least one coupling element for coupling adjacent control circuits. (**Nekorkin,** p785, C1:1 through p786 C2:23; ‘Coupling element for coupling adjacent control circuits’ of applicant is illustrated by ‘dynamics of coupled electronic oscillators’ and ‘The parameter d characterizes the strength of the coupling between the elements’ of Nekorkin.) It would have been obvious to a person having ordinary skill in the art at the time of applicant’s invention to modify the combined teachings of Sedra and Fagg by having a link between adjacent neurons as taught by Nekorkin to have the step of using at least one coupling element for coupling adjacent control circuits.

Based on the assumption that adjacent neurons relate to adjacent engines, coupled neurons relate to coordination between neurons.

Claim 32

Sedra and Fagg do not teach wherein the coupling element comprises a variable impedance element

Nekorkin teaches wherein the coupling element comprises a variable impedance element. (**Nekorkin,** p785, C1:1 through p786 C2:23; ‘Variable impedance element’ of

applicant is equivalent to 'The nonlinear function f(x) describes the three segment piecewise linear resistor characteristic g(V).' of Nekorkin.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Sedra and Fagg by having a variable input for coupling as taught by Nekorkin to have wherein the coupling element comprises a variable impedance element

For the purpose of reducing or increasing the coordination between the neurons to achieve the task at hand.

Claim 33

Sedra and Fagg do not teach the step of using a plurality of coupling elements, each coupling element connected to two adjacent control circuits to thereby provide coupling between the two adjacent control circuits.

Nekorkin teaches the step of using a plurality of coupling elements, each coupling element connected to two adjacent control circuits to thereby provide coupling between the two adjacent control circuits. (**Nekorkin,** p785, abstract; 'Plurality of coupling elements' of applicant is disclosed by 'models of coupled nonlinear oscillators' of Nekorkin.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Sedra and Fagg by having a connection between neurons as taught by Nekorkin to have the step of using a plurality of coupling elements, each coupling element connected to two adjacent control circuits to thereby provide coupling between the two adjacent control circuits.

For the purpose of being able to establish a link between two neurons for improving a coordination effort for the task at hand.

Claim 34

Sedra and Fagg do not teach the step of altering the impedance to thereby modify synchronization between coupled control circuits.

Nekorkin teaches the step of altering the impedance to thereby modify synchronization between coupled control circuits. (**Nekorkin,** p785, abstract; 'Modify synchronization between coupled control circuits' of applicant is disclosed by the study of nonlinear synchronization arrays and arrays of electronic oscillators of Nekorkin.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Sedra and Fagg by using coupling to establish synchronization as taught by Nekorkin to have the step of altering the impedance to thereby modify synchronization between coupled control circuits.

For the purpose of obtaining synchronization between neurons.

Claim 39

Sedra and Fagg do not teach the step of using at least one coupling element for coupling adjacent control circuits.

Nekorkin teaches the step of using at least one coupling element for coupling adjacent control circuits. (**Nekorkin,** p785, C1:1 through p786 C2:23; 'Coupling element

for coupling adjacent control circuits' of applicant is illustrated by 'dynamics of coupled electronic oscillators' and 'The parameter d characterizes the strength of the coupling between the elements' of Nekorkin.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Sedra and Fagg by having a link between adjacent neurons as taught by Nekorkin to have the step of using at least one coupling element for coupling adjacent control circuits.

Based on the assumption that adjacent neurons relate to adjacent engines, coupled neurons relate to coordination between neurons.

Claim 40

Sedra and Fagg do not teach the coupling element comprises a variable impedance element.

Nekorkin teaches the coupling element comprises a variable impedance element. (**Nekorkin,** p785, C1:1 through p786 C2:23; 'Variable impedance element' of applicant is equivalent to 'The nonlinear function f(x) describes the three segment piecewise linear resistor characteristic g(V).' of Nekorkin.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Sedra and Fagg by having a variable input for coupling as taught by Nekorkin to have the coupling element comprises a variable impedance element.

For the purpose of reducing or increasing the coordination between the neurons to achieve the task at hand.

Claim 41

Sedra and Fagg do not teach the step of using a plurality of coupling elements, each coupling element connected to two adjacent control circuits to thereby provide coupling between the two adjacent control circuits.

Nekorkin teaches the step of using a plurality of coupling elements, each coupling element connected to two adjacent control circuits to thereby provide coupling between the two adjacent control circuits. (**Nekorkin,** p785, abstract; 'Plurality of coupling elements' of applicant is disclosed by 'models of coupled nonlinear oscillators' of Nekorkin.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Sedra and Fagg by having a connection between neurons as taught by Nekorkin to have the step of using a plurality of coupling elements, each coupling element connected to two adjacent control circuits to thereby provide coupling between the two adjacent control circuits.

For the purpose of being able to establish a link between two neurons for improving a coordination effort for the task at hand.

Claim 42

Sedra and Fagg do not teach the step of altering the impedance to thereby modify synchronization between coupled control circuits.

Nekorkin teaches the step of altering the impedance to thereby modify synchronization between coupled control circuits. (**Nekorkin,** p785, abstract; 'Modify synchronization between coupled control circuits' of applicant is disclosed by the study of nonlinear synchronization arrays and arrays of electronic oscillators of Nekorkin.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Sedra and Fagg by using coupling to establish synchronization as taught by Nekorkin to have the step of altering the impedance to thereby modify synchronization between coupled control circuits.

For the purpose of obtaining synchronization between neurons.

Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sedra and Fagg as applied to claims 12, 13, 18-21, 26-30, 35-38, 43, 44, 46 above, and further in view of Gontowski. ('U. S. Patent 4720689', referred to as **Gontowski**)

Claim 45

Sedra and Fagg do not teach wherein the first spike generation circuit generates the first spike signal at a peak of the oscillation output signal.

Gontowski teaches wherein the first spike generation circuit generates the first spike signal at a peak of the oscillation output signal. (**Gontowski,** C7:50 through C8:13; 'Spike signal at a peak of the oscillation output' of applicant is equivalent to 'spike or pulse is formed at the peaks and valleys of the timing capacitor' of Gontowski.) It would have been obvious to a person having ordinary skill in the art at the time of

applicant's invention to modify the combined teachings of Sedra and Fagg by having the spike be generated at the peak of the oscillation cycle as taught by Gontowski to have wherein the first spike generation circuit generates the first spike signal at a peak of the oscillation output signal.

For the purpose to mimic a biological system with an established performance envelope.

4. Claims 12-46 are rejected.

Correspondence Information

5, Any inquiry concerning this information or related to the subject disclosure should be directed to the Examiner Mr. Peter Coughlan, whose telephone number is (571) 272-5990. The Examiner can be reached on Monday through Friday from 7:15 a.m. to 3:45 p.m.

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